CLAIMS

WHAT IS CLAIMED IS:

1. A micro-mirror device comprising:

a micro-mirror; and

a flexure spring supporting said micro-mirror;

wherein said flexure spring is configured to store potential energy during movement of said micro-mirror that is released as kinetic energy to drive movement of said micro-mirror when said micro-mirror is re-oriented.

2. The device of claim 1, wherein said flexure spring comprises:

a post;

a flexure supported on said post; and

supports on said flexure for supporting said micro-mirror.

3. The device of claim 1, wherein said flexure spring comprises a piezoelectric element configured to controllably orient said micro-mirror.

4. The device of claim 1, further comprising electrodes for electrostatically driving said flexure spring to controllably orient said micro-mirror.

5. The device of claim 1, further comprising drive circuitry for driving said spring to orient said micro-mirror.

6. The device of claim 1, wherein said flexure spring is supported on a substrate.

7. The device of claim 6, wherein said substrate comprises silicon.

8. The device of claim 6, wherein said substrate comprises glass or plastic.

9. The device of claim 2, wherein said flexure runs diagonally between opposite corners of said micro-mirror.

10. The device of claim 9, wherein said flexure has a non-uniform width.

11. The device of claim 2, wherein said flexure comprises a plurality of flexures extending from said post along an underside of said micro-mirror.

12. The device of claim 2, wherein said supports have a square shape, with corners of said supports being matched with corners of said micro-mirror.

13. An array of micro-mirrors comprising:

a plurality of micro-mirrors; and

a flexure spring supporting each said micro-mirror;

wherein each said flexure spring is configured to store potential energy during movement of a corresponding micro-mirror that is released as kinetic energy to drive movement of said corresponding micro-mirror when said corresponding micro-mirror is re-oriented.

14. The array of claim 13, wherein each said flexure spring comprises:

a post;

a flexure supported on said post; and

supports on said flexure for supporting said corresponding micro-mirror.

15. The array of claim 13, wherein each said flexure spring comprises a piezoelectric element configured to controllably orient said corresponding micro-mirror.

16. The array of claim 13, wherein each said flexure spring has a corresponding set of electrodes for electrostatically driving said that flexure spring to controllably orient said corresponding micro-mirror.

17. The array of claim 13, further comprising drive circuitry for driving said springs to orient said micro-mirrors in response to incoming image data.

18. The array of claim 13, wherein said array of micro-mirrors is formed and supported on a substrate.

19. The array of claim 18, wherein said substrate comprises silicon.

20. The array of claim 18, wherein said substrate comprises glass or plastic.

21. The array of claim 14, wherein said flexure runs diagonally between opposite corners of corresponding said micro-mirror.

22. The array of claim 21, wherein said flexure has a non-uniform width.

23. The array of claim 14, wherein said flexure comprises a flexures extending from said post along an underside of said corresponding micro-mirror.

24. The array of claim 14, wherein said supports have a square shape, with corners of said supports being matched with corners of said corresponding micro-mirror.

25. A micro-mirror device comprising:
a micro-mirror; and

a means for selectively positioning said micro-mirror in a desired orientation;

wherein said means for selectively positioning said micro-mirror are configured to store potential energy during movement of said micro-mirror, which potential energy is released as kinetic energy to drive movement of said micro-mirror when said micro-mirror is re-oriented.

26. The device of claim 23, wherein said said micro-mirror comprise a flexure spring which comprises:

a post;

a flexure supported on said post; and

supports on said flexure for supporting said micro-mirror.

27. The device of claim 23, wherein said means for selectively positioning said micro-mirror comprise a piezoelectric means for controllably orienting said micro-mirror.

28. The device of claim 23, wherein said means for selectively positioning said micro-mirror comprises an electrostatic means for controllably orienting said micro-mirror.

29. The device of claim 23, further comprising drive means, electrically connected to said means for selectively positioning said micro-mirror, for driving said means for selectively positioning said micro-mirror to orient said micro-mirror.

30. The device of claim 29, wherein said drive means respond to incoming image data.

31. A spatial light modulation device comprising:

a micro-mirror; and

a pliant flexure supporting said micro-mirror, said flexure having a bias;

wherein said flexure stores energy when said micro-mirror and flexure are moved against said bias; and

wherein said flexure releases said stored energy to drive movement of said micro-mirror when a force against said bias is relaxed.

32. The device of claim 31, wherein said flexure holds said micro-mirror in a default orientation according to said basis when said flexure is not driven.

33. The device of claim 31, wherein said pliant flexure comprises:

a post;

a flexure member supported on said post; and

supports on said flexure member for supporting said micro-mirror.

34. The device of claim 31, wherein said pliant flexure comprises a piezoelectric element configured to bend said pliant flexure to controllably orient said micro-mirror.

35. The device of claim 31, further comprising a set of electrodes for electrostatically driving said pliant flexure to controllably orient said micro-mirror.

36. The device of claim 31, further comprising drive circuitry for driving said flexure to orient said micro-mirror.

37. The device of claim 33, wherein said flexure runs diagonally between opposite corners of said micro-mirror.

38. The device of claim 37, wherein said flexure has a non-uniform width.

39. The device of claim 33, wherein said flexure comprises a plurality of flexures extending from said post along an underside of said micro-mirror.

40. The device of claim 31, further comprising a plurality of micro-mirrors arranged in an array

41. A method of forming a micro-mirror device, said method comprising:

forming a flexure spring on a substrate; and

forming a micro-mirror supported on said flexure spring.

42. The method of claim 41, wherein said flexure spring is configured to store potential energy during movement of said micro-mirror that is released as kinetic energy to drive movement of said micro-mirror when said micro-mirror is re-oriented.

43. The method of claim 41, wherein:

said flexure spring is pliant and has a bias;

said flexure spring stores energy when said micro-mirror and flexure are moved against said bias; and

said flexure spring releases said stored energy to drive movement of said micro-mirror when a force against said bias is relaxed.

44. The method of claim 41, wherein said flexure spring is formed by depositing material and selectively etching said deposited material.

45. The method of claim 41, wherein said micro-mirror is formed by depositing material and selectively etching said deposited material.

46. The method of claim 41, further comprising forming an array of said micro-mirrors each supported by a said flexure spring.